Hay Net Preference in Quarter Horse Mares

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Abstract

The horse is a grazing animal by nature and will forage 16-18 h per day if given the opportunity. However, today's horse management practices often include feeding a limited number of meals throughout the day and restricted access to forage. This may result in a limited time spent foraging which may lead to increased stress from boredom or anticipation of the next meal, gastrointestinal disturbances and increases in stereotypic behaviors. This often is combated by feeding in hay nets or other forms of confinement. Therefore, it would be beneficial to know the height the horses prefer their hay fed to them as well as what size opening they prefer. In this study, Six Quarter Horse mares (8.0 ± 3.3 yrs) were used in a replicated 3 x 3 Latin Square design to investigate the effect of hay net design on the time spent consuming forage by horses. Horses were individually housed overnight (1700 to 0700h) in 3.1 x 3.6m stalls and fed a similar quantity of feed (0.25% BW of a 12% CP pelleted concentrate and 1.5% BW of mixed-grass hay). The hay was divided into three equal portions and fed from one of three hay nets with different size openings: small (2.5 cm), medium (5.0 cm) and large (10.0 cm) as well as three different heights: from the ground, at the point of the shoulder, and at their wither height. Behaviors were recorded every 5 mins using a scan sampling technique. Horses consumed the hay fed in the large hay nets before eating from the small or medium hay nets all hay fed was consumed each night. The time spent by the horses eating hay averaged 2.7 ± 0.4 hr, 1.8 ± 0.3 hr, and 0.8 ± 0.1 hr for the small, medium and large hay nets, respectively. These results suggest that the horses prefer to have their hay fed to them on the ground and as unrestricted as possible.

Introduction

Horses are grazing animals by nature and will forage 16-18 h per day if given the opportunity (Harris et. al., 1999). With an increase in the restriction of horses to smaller acreage, dry lots or stables, today's management practices have changed the way horses are fed. Rather than grazing for short, frequent periods throughout the day, horses are given limited access to forage while feeding large amount of concentrates in a limited number of meals. This dietary change has created many physiological and behavioral problems in the horse.

The most common way to feed forage to horses is in the dry, cut form known as hay (Harris et al., 1999). It is often fed loose on the ground which mimics the natural grazing posture of horses. While this method requires minimal time and effort, loose hay can easily be contaminated with dirt, urine or feces. Once this happens, horses typically refuse to eat it. To avoid hay waste, it can be placed in various types of containers that restrict its availability (Martinson et al., 2015). The most common way to confine hay that is fed to horses housed in stalls is the use of a hay bag or hay net.

Although recent studies have examined the effect of hay net design on the rate of forage consumption (Glunk et al., 2014), there are no published studies evaluating horses' preference for hay nets. The height from which the hay net is hung varies greatly from person to person and there is no industry standard for this management practice. The purpose of this study was to determine if horses exhibit a preference for hay net design or height at which fed when housed in stalls.

Materials and Methods

Animals

Six Quarter Horse mares (8.0 ± 3.3 yrs) were used to determine preference for hay net design and height. Each mare received 0.25% BW of a 12% CP pelleted concentrate and 1.5% BW of mixed-grass hay each day and had access to water and trace mineralized salt *ad libitum* throughout the study. During the day (0700-1700 hr), the horses were housed in dry lots with access to mixed-grass hay and shelter at all times. The horses were housed individually in 3.1 x 3.6 m stalls overnight (1700-0700 hr). Concentrates were then divided in two equal portions and fed at 0700 hr and at 1700 hr. Hay was divided into three equal portions (0.5% BW/portion) and fed at 1700 hr.

Experimental Design and Statistical Analysis

A replicated 3 X 3 Latin square design was used to determine horse preference for hay net design and or height at which fed (Table 1). Horse behavior was recorded for a total of 14 hr each day (1700-0700 hr) a Nuvico CBHD21NL video camera (Nuvico; Englewood, NJ). The recordings were played back at a speed of 16x and the location of the eating behaviors was recorded every 5 min using a scan sampling technique. Preference was determined by which location (hay net) horses ate from first for at least 3 consecutive scans (15 min). Preference data were analyzed using PROC GLIMMIX of SAS (SAS Institute; Cary, NC). Forage consumption rate was estimated by multiplying the number of observations eating from a particular hay net by 5 min. Forage consumption data were analyzed using PROC MIXED of SAS (SAS Institute; Cary, NC).

Table 1. Order in which hay nets of varying designs (S,M,L) were used and heights (G,C,W) at which they were hung.

Week	Horse 1	Horse 2	Horse 3	Horse 4	Horse 5	Horse 6
1	S; WCG	M; CGW	L; GCW	S; CGW	M; WCG	L; GCW
2	M; GCW	L; WCG	S; CGW	L; WCG	S; GCW	M; CGW
3	L; CGW	S; GCW	M; WCG	M; GCW	L; CGW	S; WCG

S = hay net with small diameter opening (2.5 cm); M = hay net with medium diameter opening (5.0); L = hay net with large diameter opening (10.0 cm). G = hay fed loose on ground (no hay net); C = hay net at chest height; W = hay net at wither height.

Results and Discussion

As expected, horses preferred to eat the loose hay fed on the ground compared to hay fed in hay nets, regardless of the hay net design (Figured 1). However, hay fed on the ground is more vulnerable to contamination with dirt, urine and feces and providing hay in a net on the ground is not recommended as it may allow for a horse to become tangled in the net and pose a safety hazard.

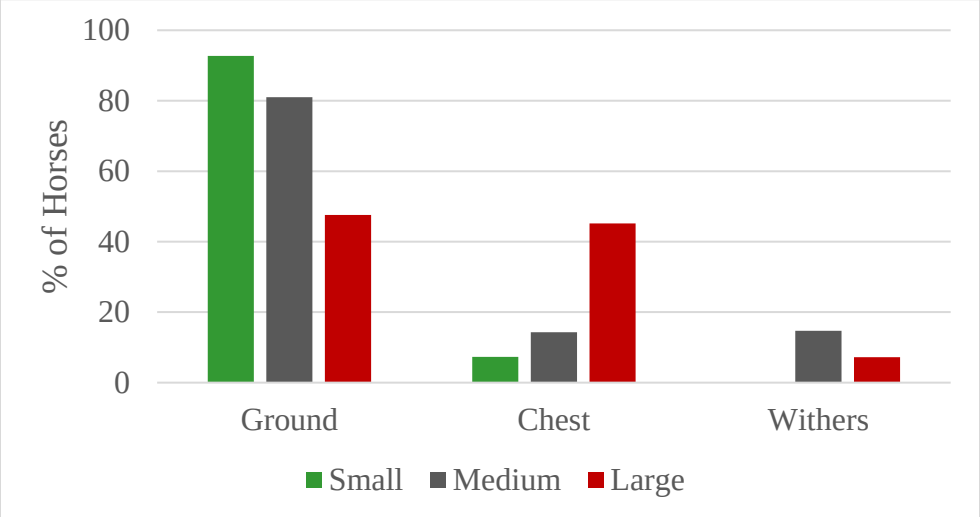

Figure 1: Horse preference for hay fed at a certain height.

Goodwin et al. (2002) demonstrated that horses will search out another form of forage if hay amount is restricted or if the hay is too quickly consumed. In the present study, the horses exhibited a preference for hay in the hay net at chest height once the ground hay had been consumed (Figure 2).

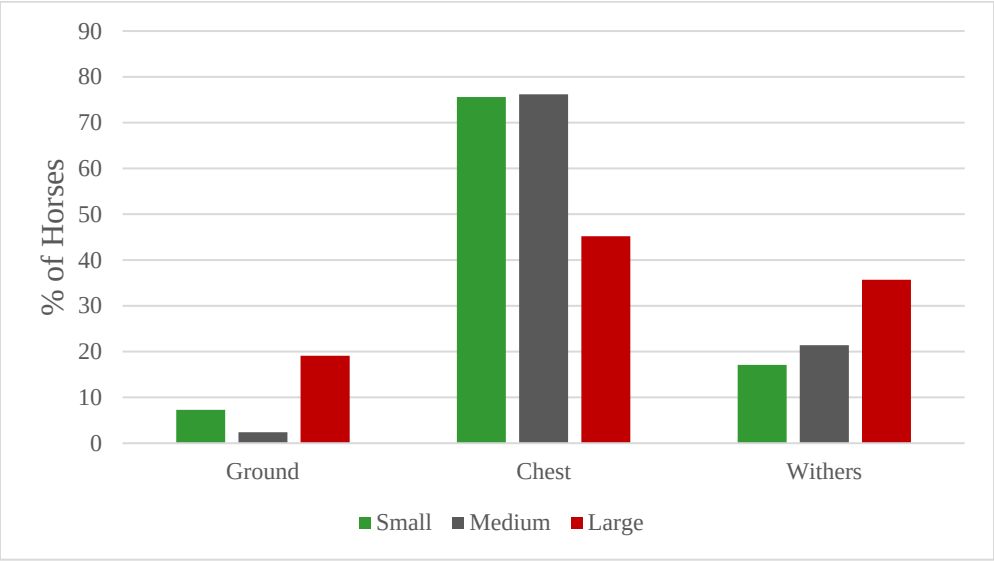

Figure 2: Horse preference for hay nets once hay fed on the ground was consumed.

Interestingly, none of the horses in the study preferred to eat the hay from the hay nets with small openings when hay was available on the ground (Figure 1). In addition, there were two horses that did not eat hay at all from the small hay nets when hung at the height of their withers. One possible explanation for their refusal to eat from the small hay nets hung at wither height may be due to physical discomfort. Previous research has demonstrated that tying a horse at their wither height or higher when transporting them in a trailer causes an increased stress response (Cregier, 1982). It was suggested that the position of their head in combination with the pulling motion may cause an imbalance in their equilibrium and increased stress on their nuchal ligament, causing them to tire quicker. Another study demonstrated when horses are

moving, the higher the head carriage the more likely a horse will fatigue faster than one with a lower head carriage due to the energy exchange in the nuchal ligament area (Gellman and Bertram, 2002).

Similar to previous studies, hay net design influenced the amount of time a horse spent eating forage (Figure 3; Glunk et al., 2014; Ellis et al., 2015). The time spent foraging in the present study averaged 2.7 ± 0.4 hr, 1.8 ± 0.3 hr, and 0.8 ± 0.1 hr for the small, medium and large hay nets, respectively. These times are greater in comparison to similar studies but that is mostly likely due to the smaller hay net openings in the current study as well as the increased time allowed to consume the forage (Glunk et al., 2014; Ellis et al., 2015).

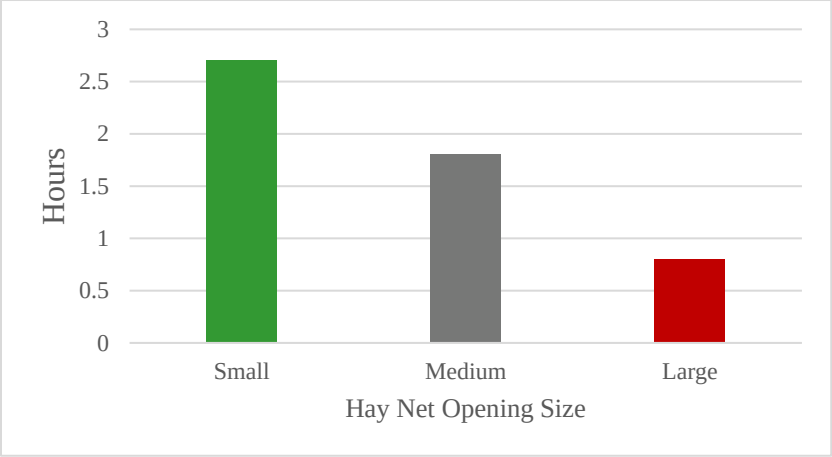

Figure 3: The average time horses spent eating forage fed in hay nets.

Overall, the findings of this study suggests that horses prefer unrestricted access to hay. However, the decreased consumption time associated with unrestricted access to a limited amount of hay may lead to stereotypic behaviors (Goodwin et al., 2002). The use of hay nets are

useful in increasing a horse's time spent foraging but consideration should be given to the size of the openings and how high the hay nets are placed in the stalls.

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